THE THEORY AND HISTORY OF EARTHQUAKES.

[Price One Shilling.]

BRITISH MUSEUM

7105. a. 1
1-8
1.

THE

Theory and History

OF

EARTHQUAKES.

CONTAINING,

I. A rational Account of their Cauſes and Effects; illuſtrated by Experiments and Obſervations on ſubterraneous Vapours, and the Manner of making artificial Earthquakes.

II. A particular and authentic Hiſtory of thoſe which have happened in theſe Kingdoms, and the moſt remarkable of thoſe abroad, *viz.* in *Sicily*, *Jamaica*, and *Lima*, with the moſt conſiderable Eruptions of *Veſuvius* and *Ætna*.

III. Some ſeaſonable Reflections on the two late Earthquakes, with a pathetic Addreſs, on that Occaſion, to the Inhabitants of *London* and *Weſtminſter*.

Humbly inſcribed to the Right Rev. THOMAS, Lord Archbiſhop of *Canterbury*.

LONDON:

Printed for and ſold by J. NEWBERY in *St Paul's-Churchyard*; R. BALDWIN, in *Pater-noſter Row*; J. BRINDLEY, in *New Bond-ſtreet*; G. WOODFALL, at *Charing-Croſs*; and M. SHEEPEY, at the *Royal Exchange*.

THE

Theory and History

OF

EARTHQUAKES.

CONTAINING

I. A rational Account of their Causes and Effects, illustrated by Experiments and Observations on Subterraneous Vapours, and the Manner of making artificial Earthquakes.

II. A particular and authentic History of those Earthquakes which have been in Great Britain and Ireland, with many Remarks on the Nature of Earthquakes abroad, viz. in Sicily, Jamaica, and Lima, with the most considerable Eruptions of Volcanos and Æstuaria.

III. Some seasonable Reflections on the two late Earthquakes, with an Address to the Public, on that Occasion, to the Inhabitants of London and Westminster.

Humbly inscribed to the Right Rev. Father in God, THOMAS, Lord Archbishop of Canterbury.

LONDON:

Printed for and sold by J. Newbery in St. Paul's Church-yard; R. Baldwin, in Paternoster-Row; J. Brindley, in New Bond-street; C. Ward, in Pall-Mall; and M. Cooper, in Gracechurch-street.

APPENDIX.

THE multitude of materials from which we have collected the ſhort Hiſtory we have given of Earthquakes, may be a ſufficient excuſe for our overlooking the following ſingular and conciſe account, which, as it is too remarkable to be omitted, and too late to be put in its proper place, we ſhall here add by way of Appendix.

On the 19th of June, 1718, an earthquake extended thro' ſeveral inland provinces of China, in ſome of which the ſhocks were ſlight, and conſequently neither long nor terrible, while, in other places, the gates and walls of cities were thrown down and laid in ruins; but it was dreadful beyond deſcription at Yong-ning-tchin, which was entirely ſwallow'd up, without leaving the leaſt mark either of men, houſes or animals; while ſeveral mountains were thrown over a plain to the diſtance of above two leagues. The earth open'd near the town of Tong-ouei, and the mountains falling, rolled over the town from north to ſouth; ſo that, in an inſtant, the whole town was in a manner overwhelmed: the treaſury, the public granaries, the houſes, priſons, priſoners, all were buried in the earth; and of the governor's whole family, only himſelf, a ſon, and a valet eſcaped. The plain roſe in waves to the height of ſix fathoms or more; and ſo terrible was the deſolation, that ſcarce three perſons in ten were ſaved.

APPENDIX.

THE multitude of materials from which we have collected the short History we have given of Earthquakes, may be a sufficient excuse for our overlooking the following singular and concise account, which, as it is too remarkable to be omitted, and too late to be put in its proper place, we shall here add by way of Appendix.

On the 19th of June, 1718, an earthquake extended thro' several inland provinces of China, in some of which the shocks were slight, and consequently neither long nor terrible, while, in other places, the gates and walls of cities were thrown down and laid in ruins; but it was dreadful beyond description at Yong-ning-tchin, which was entirely swallow'd up, without leaving the least mark either of men, houses or animals; while several mountains were thrown over a plain to the distance of above two leagues. The earth open'd near the town of Tong-ouel, and the mountains falling, rolled over the town from north to south; so that, in an instant, the whole town was in a manner overwhelmed: the treasury, the public granaries, the houses, prisons, prisoners, all were buried in the earth; and of the governor's whole family, only himself, a son, and a valet escaped. The plain rose in waves to the height of six fathoms or more; and so terrible was the desolation, that scarce three persons in ten were saved.

BRITISH MUSEUM 9 JAN 74

THE THEORY AND HISTORY OF EARTHQUAKES.

ONE would imagine, that the importance of the preſent ſubject was ſufficient to awaken the attention, not only of all perſons in this city, who are more immediately concerned, but of all who tread on the ſurface of the earth. I write not to amuſe the mind with vain ſpeculations; but by informing the judgment to mend the heart: I write not to inſpire terror, but to call to repentance: I write not to give deſpair, but to point out the way to mercy, and to ſhew by

what means we may avoid the wrath of the Almighty: I write not to impreſs the mind with ſuperſtitious, with weak and idle fears, with an enthuſiaſtick dread, or groundleſs apprehenſions; but to ſhew the moſt ſolid foundation for that rational, that juſt, that noble confidence in God, that reſignation to the will of Heaven, which every chriſtian ſhould feel, and which whoever does feel, will have a ſufficient ſupport, to bear him up amidſt the moſt dreadful conflicts and convulſions of nature, and enable him to think of, and ſupport in the moſt awful moments, the horrors of a ſudden and unexpected death, with a manly, a chriſtian calmneſs and compoſure.

All nature is under the direction of the God of nature: He commands, and the earth obeys his voice. Not that earthquakes are contrary to the conſtruction of the earth: not that they are in themſelves miraculous, or that they require a very extraordinary and particular exertion of the power of the deity. No, they are a conſequence of the original frame of the world, and agreeable to the laws of matter, and therefore I ſhall endeavour to give a juſt idea of their cauſes and effects, deſiring my readers ſtill to remember, that tho' they reſult from the ſettled courſe of things, they are yet, as to their effects, under the guidance and direction of a wiſe over-ruling providence. And as every man in this city is immediately and perſonally concerned, I ſhall adapt this inquiry into the laws of nature, as much as poſſible to the capacity and underſtanding of every man, endeavouring

vouring at leaſt, to dreſs my ideas in ſuch a manner, as that they may be known and received by thoſe who are unacquainted with ſubjects of this nature.

In order to give a diſtinct and conciſe account of the origin of earthquakes, I ſhall confine myſelf to a few plain and natural obſervations, confirmed by the teſtimony of facts and experiments.

It is neceſſary to obſerve, 1. That the earth every where abounds with huge ſubterraneous caverns, veins and canals, and more particularly about the roots of mountains: and that theſe are neither ſo large nor ſo numerous in this, as in other countries, may be one reaſon why our earthquakes here have been ſo very few, and confined to ſo narrow a compaſs; but that we have ſuch cavities in England, is too well known to admit of any doubt, ſince they are frequently broken into by perſons digging in coal-pits, mines, and wells.

2. That theſe cavities, more particularly at certain times and ſeaſons, are filled with ſulphureous and inflamable exhalations is ſufficiently proved from their ſometimes ſtriking thoſe dead, who firſt open a paſſage into them, and from the exhalations of wells and mines, which have proved equally fatal*.

3. That

* Of this there are many inſtances mention'd in the Philoſophical Tranſactions; one of which we beg leave to tranſcribe,

3. That theſe mineral vapours, or exhalations are capable of taking fire, is proved from their frequently

---

ſcribe, to illuſtrate the truth of the obſervation. A farmer in the Iſle of Wight ſunk a well to the depth of forty-five feet. The men employed in carrying on the work, proceeded without any inconvenience, till towards the evening of the twelfth day, when they were much annoy'd by a faint ſuffocating heat, reſembling that coming from the mouth of an oven, and which, as they were drawn up, was remarkably perceived when they came over againſt a mineral ſtratum which they had before dug thro' without finding any ill effects, and which now emitted a warm ſulphureous exhalation.

The next morning a luſty young man raſhly attempted to go down, by means of a ſingle rope, which had been uſed to draw up the earth: but as ſoon as he came over againſt the above-mentioned ſtratum, he became incapable of ſuſtaining his own weight, fell down to the bottom, and died immediately.

Another young man not ſuſpecting the cauſe, had the rope nimbly drawn up, and having ſeated himſelf a-ſtride a croſs ſtick, fix'd to the rope for that purpoſe, was haſtily let down to his friend's aſſiſtance: but when he came to the ſame diſtance from the top, he was obſerved to give the rope a very great ſhock; and when he came to the bottom, fell down as the other had done before him, was ſeized with violent convulſions, which held him about a quarter of an hour, and then he expired.

A third perſon, in hopes of fetching up this ſecond before he was dead, was tied faſt into a large baſket, and let down more warily: but when he came to the ſame ſtratum, finding his breath going (as he expreſſed it) cried out, and was drawn up again; but remained in the open air, for the ſpace of near half an hour, pale, panting and ſpeechleſs.

The next day a cat was let down, which was at the ſame place ſeized with convulſions: but being quickly drawn up again, ſoon came to herſelf, and this experiment was repeated ſeveral times.

Water being ſcarce in that place, the well was left open for about eight months, in hopes the damp might at length entirely leave it; but inſtead of that, it became worſe, and not confining itſelf within its firſt bounds, overflowed at the top; where

frequently doing ſo even in mines, by only the † touch of a lighted candle, and then by heating

---

where, when the air was moiſt, it appeared like a thin white fog; and when the air was dry, could be perceived like a warm breath, at all times diffuſing a ſulphureous ſtench, ſomething like that which ariſes from filings of iron corroded with vinegar, affecting thoſe who came into it, with giddineſs, ſhortneſs of breath, and a propenſity to vomit. So that the well becoming troubleſome, was filled up.

The vein from whence the fatal effluvia was emitted, and which is continued to the neighbouring clift, is a crude ore made up of iron, ſulphur, and acid ſalts mixt with pyrites.

† The following inſtance will ſufficiently prove the certainty of this fact. The coal-works at Moſtyn in Flintſhire, lies forty, fifty, and in ſome places ſixty yards under the level of the ſea: when the coal was firſt found, it was covered with water, ſo that it could not be wrought down to the bottom: a cave was therefore made to gain room to work, and to draw down the ſpring of water to the eye of the pit. After they had gone a conſiderable way under ground they began to want air, the fire damps gradually formed themſelves, and appeared in the crevices and ſlits of the coal, with a ſmall bluiſh flame in continual motion. The applying a candle to it would make it fly with a ſudden noiſe to another crevice, where it appeared blazing, and moving as before; but did no further harm. However ſinking a pit on the hollows or deads of the upper work, at 16 or 17 yards diſtance from the firſt pit, the fire damps began again to appear, accompanying the workmen ſtill as they ſunk, when at laſt they found that their want of perpendicular air from above was the great cauſe and promoter of theſe damps; for all their air came from the firſt pit; yet notwithſtanding this, they continued ſinking to fifteen yards, but upon intermitting the work for forty-eight hours, and the damp in the mean time gaining greater ſtrength, it was ſeen flaſhing and ſhooting from one ſide to the other. After ſeveral experiments, they ventured to faſten ſome candles to a hook hanging at the end of a rope, when lowering theſe a little way into the ſhaft of the pit, the fiery exhalation mounted up, blew out the candles, diſperſed themſelves about the eye of the pit, and burnt the hair, beards, and cloaths of the workmen, and ſtruck ſome of them down, making a noiſe like the bellowing of a bull, but much louder, and leaving a ſmoak

and

heating and conſequently expanding the air, which ſtruggles for a vent, all the effects of an

---

and very noiſome ſmell behind it. At laſt, one of the men, more indiſcreet than the reſt, went with his candle over the eye of the damp pit, at which the ſulphureous ſteam immediately catched, and flew to and fro over all the hollows of the work, with a great wind, a continual fire, and a violent roaring noiſe; moſt of the men inſtantly fell on their faces, and hid themſelves as well as they could, in the looſe ſleek, (or ſmall coal,) or under the ſhelter of poſts, yet the damps returning out of the hollows, and drawing towards the eye of the pit, came up with incredible force; tore moſt of their clothes off their backs, and ſinged what was left, burning their hair, faces, and hands; and the blaſt fell as ſharp upon their ſkin as if they had been whipp'd with cords; ſome that had leaſt ſhelter, were carried 15 or 16 yards from their firſt ſtation, and beaten againſt the roof of the pit, and ſides of the poſts; and then were left ſenſeleſs for a conſiderable time, ſo that it was long before they could hear or find each other. As it drew up to the day pit, it caught one of the men that was next the eye along with it; and aſcended with a dreadful crack, not unlike a cannon, though ſomething of a ſhriller ſound, and this was heard with the wind 14 or 15 miles off; and ſuch a pillar of ſmoak was ſeen, as for a long time darkened all the ſky. And what is ſtill more remarkable, tho' the brow of the hill was 18 yards high above the pit, and filled with trees of 15 or 16 yards in length, yet the man's body and other things from the pit, were ſeen at leaſt 100 yards above the tops of the higheſt trees. On this pit ſtood a horſe engine of ſubſtantial timber and ſtrong iron work, on which lay a trunk or barrel, of about 1000 pound weight, for winding the rope up and down; it was then in motion, one bucket going down and the other coming up with water; this trunk was faſtened to that frame with locks and bolts of iron; yet it was thrown up and carried a good way from the pit, and pieces of it, tho' bound with iron hoops and ſtrong nails, were blown into the neighbouring woods; as alſo the two buckets, and ends of the ropes; the whole frame of the engine was moved out of its place, and the cloathes, hats, and caps of ſuch as eſcaped, were afterwards found torn to pieces, and thrown into the woods at a great diſtance from the pit. See *Memoirs of the Royal Society*, *p.* 80, 81, 82, 83.

earth-

earthquake are produced, tho' in a leſſer degree, on account of the eaſineſs with which the impriſoned air and fire find a vent. It is the nature of air to be compreſſed by cold, and to expand itſelf by heat, ſo as to require much greater room; to preſs on all ſides, to ſtruggle and reſiſt the greateſt force, and never to be at reſt till it has found a paſſage.

4. That theſe caverns have a communication with others, and frequently abound with the pyrites, a mineral that partakes of the ſubſtance of iron and brimſtone, and has all the dreadful effects of gunpowder. The vapours that exhales from it is a ſubſtantial ſulphur, extremely inflamable, and with a little motion, takes fire of it ſelf.* When it eſcapes into the air, it is formed into clouds and becomes the material cauſe of thunder and lightning; and therefore all the difference between theſe and an earthquake is, that in the one caſe it takes fire in the air, and in the other, under ground; and this appears to be inconteſtibly the caſe, from the reſemblance of the noiſe of a violent earthquake to that of thunder, which is carry'd on as in a

* It may be objected that no body is kindled by itſelf; but this is evidently a miſtake; for vegetables will heat and take fire of themſelves, as in the frequent inſtance of wet hay; the pyrites, both in groſs and in vapour, actually fires of its own accord. Again, the Vulcano's all over the world are a ſufficient proof of this; it is very probable that they are mountains conſiſting in a great meaſure of pyrites, as appears by the quantities of ſulphur thence ſublimed, and the application of the loadſtone to the ejected cinders. See the ingenious Dr. Liſter *on the cauſe of earthquakes and vulcano's. Phil. Tranſ.* N° 157.

train

train ſet on fire ; the one rolling through the air as the vapours chance to drive, and the other in like manner under ground ; and eſpecially in the ſame ſulphureous ſmell being found in any thing burnt with lightning, as in the waters, &c. caſt up by earthquakes, and in the air after both.

5. This dreadful mineral is found in England, as well as in other places more ſubject to earthquakes ; but in ſmaller quantities, and generally containing leſs of the ſulphur, and this may be a principal reaſon why our earthquakes have been hitherto very ſlight, and comparatively few ; but we have ſome however extremely full of ſulphur.

6. When the vapour ariſing from the pyrites meets with large quantities of nitre, bitumen, vitriol, &c. the exploſion becomes more dreadful, all the inflamable matter is immediately on fire, and nothing is ſeen but ruin and devaſtation, which is more violent in proportion to the oppoſition it meets with, rocks of the hardeſt marble becoming more ſhattered than a pavement of ſand, earth, or gravel.

7. All burning mountains, as Ætna, Veſuvius, and others, are only ſo many vents ſerving for the diſcharge of the inflamable air and ſubterraneous fire ; and when there happens to be ſuch a ſtructure and conformation of the interior parts of the earth, as to permit the fire to paſs freely and without impediment from the caverns wherein it aſſembles to thoſe vents ; it then readily

readily and eaſily gets out, from time to time, without ſhaking or diſturbing the earth; but where ſuch communication is wanting, or paſſage not ſufficiently large and open, ſo that it cannot come at the vents, it heaves up, or ſhakes the earth, with greater, or leſs impetuoſity, according to the quantity of fire thus aſſembled, till it has made its way to the mouth of the Vulcano. On this account, there are few countries much annoy'd with earthquakes, but have one of theſe fiery vents, which are conſtantly in flames when any earthquake happens, diſgorging that fire, which, whilſt under ground, was the cauſe of this diſaſter, without which it would rage in the bowels of the earth much more furiouſly, and with greater havock than it does.

To illuſtrate this account of natural earthquakes, I ſhall mention a method of forming an artificial one, which will have the effects both of an earthquake and a vulcano in miniature. To twenty pounds of iron filings, add as many of ſulphur; mix and temper the whole together with a little water, to the conſiſtence of a paſte, then putting it three or four foot under ground, it will preſently begin to heat, and in a few hours the earth will begin to tremble and crack, and fire and ſmoke will burſt through. Such is the effect even of two cold bodies, in the cold ground: there only wants a ſufficient quantity of this mixture to produce a true Ætna. If it were ſuppoſed to burſt out under the ſea it would produce a water-ſpout, and if it were in the clouds the effect would be

thunder and lightning. This compoſition is an artificial kind of the Pyrites, which has all the effects of the natural, and which requires no more than a little moiſture to ſet it on fire.

But to give another inſtance no leſs ſurpriſing.

Sir James Lowther having made an experiment on ſome air which he collected out of a coal mine, and brought in bladders cloſe tied by ſea to town. [See *Phil. Tranſactions*, N°. 429. p. 109.] The effect of which was, that the air being preſs'd out of the bladder through the ſmall end of a tobacco-pipe, would catch fire from a lighted candle, and burn like an inflameable ſpirit, till it was all conſumed.

Mr Maud, conſidering that this was only owing to a great quantity of ſulphurous vapours floating in the air, was induced to make an eſſay, by an artificial mixture, to produce the like effect. It is well known to every one converſant in chemical matters, that moſt mettles emit great quantities of ſulphurous fumes: iron, whilſt diſſolving in oil of vitriol, emits a great quantity of theſe, which are very inflameable, and not eaſily to be condenſed. Theſe fumes Mr Maud collected into a bladder, with the deſired ſucceſs; and having produced before the Royal Society two bladders of this factitious air, at the ſame time that Sir James Lowther made a trial of his, they both exhibited the ſame phænomena. In order to make this preparation, Mr Maud had taken two drachms of

oil

oil of vitriol, and mixed it with eight drachms of common water, which he put into a glaſs with a flat bottom, about ten inches wide, and three inches deep, with a long neck; to this he added two drachms of iron-filings. Upon this, there inſtantly aroſe a great heat, with a violent ebulition, and the iron was wrought upon very faſt, with a copious exhalation of fumes. To the neck of the glaſs he luted a bladder void of air, the neck of the bladder being faſtned to a tobacco-pipe, when the fumes ariſing from the diſſolving mettle, ſoon puff'd up the bladder to its full extent, and after that another bladder in the ſame manner. Theſe two bladders were tried before the Society, and exhibited a flame very like that of Sir James Lowther's in the ſmell, tho' ſomewhat different in colour. After Mr Maud had preſs'd part of the air out of the bladder, by drawing back the hand, the flame was ſucked into the bladder, and all at once ſet on fire what inflameable air remained, which, burſting the bladder, went off like a gun with a great exploſion.

What is particularly worthy of obſervation, is, that all the air which filled the bladders received its birth, as it were, out of the mixture, or elſe was recovered from the body of the mettle.

This experiment ſufficiently explains, and illuſtrates the cauſe of earthquakes, vulcano's, and all fiery eruptions from the earth: for nothing more is requiſite than iron, vitriolic acid, and water: now iron is generally found

accompanied with ſulphur; and common ſulphur may be annalized into an inflameable oil, and an acid liquor like oil of vitriol. This acid, therefore, by being diluted, in the bowels of the earth, with a little water, by a ſpring ſwelling higher than uſual, and forcing its way into the beds of this mineral, ſurrounds the iron, and works upon it in the ſame manner as diſcribed above; an effervеſcence and inteſtine heat ariſes; the air which comes from the mixture is rarified, and becomes very elaſtic; its impetus, by how much the more it is compreſs'd by the incumbent weight of earth, is increaſed even to an unlimited degree; and, at length, like gunpowder will remove all obſtacles, force a paſſage, and exhibit to the ſpectators above ground, the terrible phænomena of earthquakes and eruptions. And ſometimes theſe inflameable fumes, if very much heated, will, as ſoon as they come to the open air, burſt into flame, and ſo produce thoſe fiery eruptions which have been ſo frequently experienced.

But why then, it may be aſk'd, were theſe dreadful vapours, theſe pernicious minerals ever ſuffer'd to exiſt? I anſwer:

Theſe exhalations, ſo inflameable, and when grown too much expanded for the narrow limits that conſtrain them, ſo dreadful in their effects, are neceſſary to the propagation of the moſt uſeful minerals; and, by their gently tranſpiring through the earth, to the growth and fruitfulneſs of plants, and, in a great meaſure, to the very being of all animal and vegetable life:

life: to repleniſh the air; and, by forming winds and ſtorms, to keep both the air and the ſea from ſtagnation: they give fragrance to our flowers, taſte and nutrative juices to our corn: they are an antidote againſt the ſalt vapours which ariſe from the ocean; they form the moſt valuable medicines, and give that healing virtue to our mineral ſprings; and yet when too powerful cauſe immediate death. Thus the Divine Being makes the greateſt evils the greateſt bleſſings, and the ſame materials, at his command, or as he pleaſes to portion them out to us, give us life or death. How wonderful, how aſtoniſhing are all his works! in wiſdom has he made them all! how infinite the ſagacity! how ſtupendous the power that for ſo long a ſeaſon, for ſo many ages together, has moderated theſe vapours, and ſuffered them to exhale only in bleſſings on our native country! Say, O thou who laugheſt at providence, who with all thy wonderous ſkill of boaſted knowledge, denieſt the interpoſition of the Deity, ſay, why it happens that when theſe exhalations ſwell their ſecret caverns, and it becomes neceſſary for them to mingle with the upper air, no heavy rains for ſo long a time have obſtructed their paſſage in ſuch a manner as to throw this iſland into heaps of ruins! Say, why the parching heat has never yet drawn up all theſe vapours, and ſuffocated us with their ſulphurous ſteams! Think --- think and acknowledge a particular providence. Think and own this important truth, that a particular providence demands a particular gratitude;

and

and that national bleſſings demand returns of national thankfulneſs.

From all this, we may infer the abſurdity of pretending to foretel an event, that as to time and circumſtances hath no dependance on any viſible object. Whether the ſubterranious vapours are already broke looſe by the laſt ſhock, or whether we ſhall ſtill have one or many more of greater violence, cannot be determined; much leſs can it be foretold what inflameable exhalations will ariſe from unknown undiſcovered beds of minerals; at what time they will rarify the air of the deep and ſecret caverns of the earth; and when they will ſtruggle and break looſe from their priſons. All that the wiſeſt of us can know, is, that if theſe mineral exhalations are not yet broke looſe, we muſt ſoon have another, and probably a more violent ſhock. It is, indeed, preſumptuous to pretend to determine farther, where neither the extent and depth of the caverns, the quantity of the minerals, or the greatneſs of the exhalations are known. Theſe are ſecrets concealed from the ſearches of human wiſdom, and therefore can be known to none but God alone.

England has had but few earthquakes, there being no more upon record than 18 or 20, for the laſt 700 years, and the ſhocks of theſe have in general been neither great, nor very extenſive, doing little or no damage, and being generally confined within the compaſs of a very few miles. This may, in ſome meaſure, proceed from the ſcarcity and diſtance of theſe ſubterraneous caverns;

verns; but where theſe are more numerous, the fire runs through little openings from one great cavity to another, and, as many mines may be ſprung with one continued train of powder, forces its way to an incredible diſtance. Thus in 1586, an earthquake in Peru, ran from ſouth to north 900 miles, and in 1601 another extended from Aſia to the Sea which waſhes the French coaſt, at the ſame time ſhaking Hungary, Germany, Italy, and France. In this caſe, as Mr Boyle obſerves, it is not to be doubted but that the ſhock of the exploſion may extend much farther than the danger.

I ſhall here enter firſt into a particular Hiſtory of thoſe earthquakes, which have happened in our own country; and then take notice of the moſt conſiderable of thoſe that have been felt in different parts of the world; from a comparative view of which the reader will plainly perceive that the theory we have advanced is rational and juſt.

On Wedneſday *April* 6th, 1580, about ſix in the evening, an earthquake was felt all over England. The great clock in the palace of Weſtminſter ſtruck of itſelf againſt the hammer, as did ſeveral clocks and bells in the city and country, part of the temple church fell down, ſome ſtones were thrown from St Paul's, and at Chriſt-church, during divine ſervice, a boy and girl were kill'd by a ſtone falling from the top of the church, and many were hurt by the fall of chimneys. At the ſame time a piece of the cliff at Dover and part of the caſtle wall

were

were thrown down, as alſo a part of Saltwood-caſtle in Kent. In the eaſt part of Kent there were three ſhocks, at ſix, at nine, and at eleven at night.

January 13, 1583. In the pariſh of Armitage, a piece of ground, containing three acres, was torn up by an earthquake, removed from its original ſtation, and thrown over another cloſe to the diſtance of forty perches; the hedges with which it was ſurrounded encloſed it ſtill, and the trees ſtood upright. Mr Stowe ſays, that it ſtop'd up a highway leading to the market town of Cerne; and that the place from whence this field was torn, reſembled a great pit.

January 19, 1665-6. Towards evening a ſmall earthquake was felt near Oxford; it was perceived at Belchington, and alſo at Boſtol, Horton, Stanton, St John's, and Whately. It was not felt at all thoſe places at the ſame time, but moved ſucceſſively from Belchington to Whately. It was very conſiderable at a place called Brill, where a gentleman's houſe ſhook very much, ſo that the ſtones in the parlour evidently moved to and fro; but this is not very wonderful, ſince the hill on which it ſtood is ſtored with mineral ſubſtances.

In the year 1677, at about eleven at night in chriſtmas time, an earthquake was felt at Wittenhall near Wolverhampton in Staffordſhire; it conſiſted of only one ſhock, and by the noiſe which

which attended it, was thought to move from ſouth to north.

November 4, 1678. At about eleven at night there happen'd another earthquake at Breewood, in the ſame county; it began with a noiſe like a flat rumbling, diſtant thunder, yet ſo loud as to awaken people in their beds. The earth moved very ſenſibly three ſeveral times, each motion being at about half an hours diſtance from the other. The night following was attended with another of a leſs kind, yet not without noiſe.

January 4, 1680. About ſeven in the morning an earthquake was felt at Chedſey in Somerſetſhire, which extended ſome miles round. It ſhook the houſes pretty much, and was attended with a noiſe reſembling a ſudden guſt of wind; or, as others imagined, the ſhock and noiſe was not unlike that of ſome great thing thrown upon the ground. It was of very ſhort continuance. The air was very calm, it having been a froſty night, and the ſnow which fell the day before lying upon the ground.

September 17, 1683. There was one at Oxford. It was preceded by a remarkable calmneſs in the air; it ſhook the earth with a tremulous and vibratory motion extremely quick; the pulſes were a little diſcontinued, and yet they came ſo thick that there was no reckoning them, tho' the whole earthquake continued here ſcarce more than ſix ſeconds of time. As tremulous and vibratory motions are proper

to produce ſounds, ſo this earthquake was accompanied with a hollow murmuring, like a diſtant thunder; which ſound kept time ſo exactly with the motion, and was ſo conformable to it in all reſpects, that it plainly appear'd there was the ſame reaſon for both.

September 8, 1691. At two in the afternoon, an earthquake was felt at Deal, Canterbury, Sandwich, and Portſmouth. The houſes were ſhaken, the pewter and braſs totter'd on the ſhelves, and ſeveral chemneys were thrown down; this earthquake was ſaid to continue near ſix minutes.

December 28, 1703. An earthquake was felt at Hull, about three or four minutes after five in the evening; it made the windows rattle, ſhook the houſes, and threw down part of a chimney; the ſhock came and went very ſuddenly, and was attended with a noiſe like wind, tho' there was then a perfect calm. It was felt in much the ſame manner at Beverly and other places, and particularly at South Dalton; but was more violent near Lincoln. It was felt pretty much at Selby and Navenby, where it was attended with a ſudden noiſe, which reſembled the rumbling of two or three coaches driven furiouſly; it ſhook the chairs on which people ſat; and even the very ſtones were ſeen to move. It extended into Nottinghamſhire, where there were three ſhocks each of which reſembled the rocking of a cradle. A little before there was a violent ſtorm.

In 1727, there was another in England, which was

was felt at Reading and ſeveral parts adjacent, and in 1732 one at Strontian in Argyleſhire, which extended all along the weſt coaſt of Great Britain; but to no great breadth.

October 10, 1731. At about four in the morning an earthquake of the vibratory kind, was felt at Aynho in Northamptonſhire; it alarmed all the neighbouring villages; it proceeded from eaſt to weſt, the concuſſion laſting about a minute; and in the morning the ſky look'd of a ſand colour. It had been over about a minute when ſome of the inhabitants obſerved a great flaſh of lightning.

October 25, 1734. Between three and four in the morning, an earthquake was felt at Havant in Suſſex; the ſhock was very conſiderable, ſo that a church bell was heard to ſound. The beds ſhook with a quick tremulous motion, which continued about two or three ſeconds, and then ceaſed; but after a ſhort intermiſſion was again repeated for the ſame length of time. The air was perfectly calm, tho' it rained, and the wind roſe perſently after.

The *Philoſophical Tranſactions*, p. 305. give an account of an earthquake felt very ſenſibly at a place called Skeathill, about eight miles ſouth-weſt from Dartford, and that the ſame Morning a piece of ground in a meadow in Farningham about five miles ſouth of Dartford, ſunk ſo as to leave a pit about eight or ten feet over, and nearly of the ſame depth, which was that morning filled with water, within three or four feet of the top, tho' that ſpot of ground

was ſuppoſed to have been as ſound as any about it, carts having ſeveral times gone over that very place.

April 30, 1736. At noon, and at twelve next morning, there was a violent earthquake along the Ockhil-Hills in Scotland, which rent ſeveral houſes, and put the people to flight. Theſe two ſhocks were each attended with a great noiſe under ground.

Dec. 30, 1739. In Hallifax, Eland, Huddersfield, and other towns in the Weſt-Riding of Yorkſhire, was felt a ſudden and violent earthquake, the moveable utenſils rattling and rolling about, and people fearing to be tumbled out of their beds. It ſeemed as if the earth had moved out of its place, in a line parallel to that of the horizon, and again returned to its former ſituation, with reciprocal vibrations, which ended in a minute or two with a hizzing hollow report, and a quivering of all the things on its ſurface.

Tueſday, Feb. 8, 1749-50. At about thirty minutes after twelve an earthquake was ſuddenly felt throughout London and Weſtminſter, and alſo at Deptford, Greenwich, and even as far as Graveſend, at Payne's Bridge between Rumford and Brentwood, at Cooperſale near Eping, at Woodford, Waltham-ſtow, Hertford, Highgate and Finchley; but not at Barnet: It was juſt perceived at Richmond in Surrey, and Bromley in Kent, tho' not at all at Deal or Canterbury. The councellors in the Court of King's-Bench and Chancery in Weſtminſter-

Hall expected the building to fall, and in the new buildings about Groſvenor-Square, people ran out of their houſes, the chairs ſhaking, and the pewter rattling on the ſhelves: in Southwark, a ſlaughter-houſe, with a hayloft over it was thrown down, as was a chimney in Leadenhall-ſtreet, another in Billiter-Square, and ſeveral chimneys and part of a houſe near Horſleydown. This earthquake was attended with a flat noiſe, but not very loud. The weather had been rainy and cloſe for ſome days. That morning there had been a thick fog, and at the time of the ſhock the air was remarkably calm.

Thurſday, March 8, 1749-50. Between five and ſix in the morning, another earthquake was felt in London and Weſtminſter, more violent, and attended with a greater noiſe than the former, the ſound, as in many other places, already mentioned reſembling a hollow diſtant thunder. Juſt before the ſhock a ball of fire was ſeen in the air to the weſt of the city. The ſhock (like that in 1580, and many others in England, as well as the great earthquake at Lima, in 1687) was of the vibratory kind. People were ſhook in their beds with a violent motion, which with the noiſe of the earthquake and rattling of the windows, awoke almoſt all who were aſleep, and in an inſtant, as far as it extended, filled every one with conſternation.

A ſpring burſt out in a cellar at the corner of Dean-Street, Fetter-Lane; and the next day, the water was gone as remarkably as it came, and the floor left as dry as if no water had been there.

Two

Two ſtacks of chimneys, and part of a building in Bermondſey-Street, were thrown down, and one ſtack of chimneys on Saffron-Hill. At Iſlington, the bells at ſeveral gentlemens doors rang, as if pulled by a ſudden jerk. It ſeemed to roll along from weſt to eaſt like a wave in a violent ſtorm, and was ſenſibly felt as far as Epping in Eſſex, as alſo at Chiſelhurſt, Beckenham, and Croydon; at the two laſt places the hammers of the clocks ſtruck againſt the bells. It is aſſerted by many that this was preceded by a ſmall ſhock, at about two in the morning.

From the conſideration of there being an interval of an exact lunar month, between this earthquake and the former, ſome have pretended to foretel, that we ſhall have another at the ſame diſtance of time from the laſt; but we have already proved the abſurdity and folly of theſe kind of predictions. It is granted that we may, and probably ſhall have another, and a greater too; but the particular day or night God only knows.

Another has advanced a notion, which I am ſorry to ſay, is as weak and ridiculous as it is unphiloſophical, and which I ſhould not have thought worth taking notice of, if it had not gained ſome degree of credit; and that too with men of ſenſe and underſtanding. It is not doubted however but that the author of this report, has declared his real ſentiments, and that his making them public *might*, and very probably *did* proceed from a kind and good natured intention to remove what he thought the groundleſs apprehenſions

henſions of the public: and therefore, though his opinion may be cenſured, and exploded, his conduct, in making it public, muſt be approved. I ſhall not take upon me to examine all the reaſons he has given for ſuppoſing this to be what he calls an airquake, ſince by this hiſtory, it will be found that to prove this to be no earthquake, he has brought the ſtrongeſt reaſons to prove it to be one; all that I ſhall ſay, is, that the exploſion of a ball of fire, capable of ſhaking the earth, and conſequently the houſes for ſo wide an extent, muſt deſtroy every thing within the ſphere of its more immediate activity. If a ball of fire had burſt over Weſtminſter, with ſuch a violence, as by a percuſſion of air to move the bells at Beckenham and Croydon, the houſes of Weſtminſter would have been ſtruck down with the blaſt, and the men deafen'd by the violence of the report. The city of London would have been ſtun'd with the ſound, and ſhatter'd by the blow; while Wapping would have heard and felt much leſs of both. Beſides an exploſion in the air might have ſtopp'd, but could never have raiſed a ſpring in the earth. On this occaſion it cannot be foreign to our ſubject to obſerve here, that an earthquake in New-England, on the 29th of *October*, 1727, which extended even to Penſilvania on the weſt, and to Caſco-Bay on the eaſt, was preceeded immediately before the ſhock by a flaſh of lightning, as was the following moſt dreadful earthquake in Sicily, by a light in the air.

Sunday, *March* 18, 1749-50. Between five and ſix in the evening, the inhabitants of Cows,

in

in the Iſle of Wight, were ſurprized with a ſtrange rumbling noiſe in the air, which was immediately followed by a ſudden ſhock of an earthquake; and which was ſenſibly felt all over the Iſland, and likewiſe at Portſmouth and Goſport; but not ſo violently at the latter place as at the former.

Let us now turn our eyes to the dreadful ſcenes of deſolation, which have overſpread Sicily, Jamaica, Lima and Calao.

Sicily has ſuffered many terrible earthquakes, but none more dreadful than that on the 10th of *January*, 1692-3, which not only ſhook the whole iſland, but even Naples and Malta. It was not preceeded by any darkneſs in the air, but by an agreeable, a ſerene, and warm ſeaſon, which was the more obſervable, on account of its being unuſual at that time of the year. The preceeding evening, there was a great light obſerved in the air, which was taken for the reflection of a fire made by the country people, and which ſeemed to keep at the ſame diſtance, tho' the ſpectators went directly towards it; whilſt they were obſerving this appearance, the earthquake began, upon which the light inſtantly vaniſh'd, and the waves of the ſea, which before the ſhock, beat gently on the ſhore, began now to make a dreadful noiſe. The next day the air was over-ſhaddowed with darkneſs, and tinged with a deep yellow, while the darkened ſun ſtruck the minds of the ſpectators with the melancholy preſage of an earthquake, more terrible than that which happened the night before;

fore ; and indeed their fears were too well founded. The earth during four minutes beat and heaved with a regular motion, like that of a pulſe, but ſo violent, that it was impoſſible for any body to keep their feet on the agitated earth ; nay, thoſe who lay on the ground were toſſed from ſide to ſide, as on a rolling billow, and walls were thrown ſeveral paces from their foundations. In open places the ſea ſunk conſiderably, and in the ſame proportion in ports and encloſed bays. In ſeveral places the earth opened in very long clefts, ſome an hand's breath, others half a palm, and others like great gulfs ; from theſe openings in the vallies, there iſſued ſuch a quantity of water, as overflowed a great ſpace of ground, which to thoſe that were near it, had a ſtrong ſulphurous ſmell. The miſchief it did is amazing ; almoſt all the buildings in the country were thrown down. Fifty-four cities and towns, beſides an incredible number of villages, were either deſtroy'd, or greatly damag'd. We ſhall only inſtance the fate of Catania, one of the moſt ancient and flouriſhing cities in the kingdom, a univerſity, and the reſidence of ſeveral monarchs. This once famous, now unhappy Catania, to uſe the words of an author of credit, had the greateſt ſhare in the tragedy. Father Anthony Serrovita, being on his way thither, and at the diſtance of a few miles, ſaw a cloud as black as night hovering over the city, while from the mouth of Montgibello, there aroſe great ſpires of flame, which ſpread all around. The ſea ſuddenly began to roar, and riſe in billows ; and there was a Clap, as if all the artillery in the world

had been diſcharged. The birds flew about aſtoniſhed, the cattle in the fields ran up and down, as it were, wild with the affright, and roaring and bellowing as if affected with the terrors of ſome dreadful cataſtrophy. The horſe on which Father Serrovita rode, and the horſes of thoſe who accompanied him, ſtep'd ſhort, trembling; ſo that they were forced to alight. They were no ſooner on their feet, than they were lifted up above two palms, when caſting his eyes towards Catania, he with amazement, ſaw nothing but a thick cloud of duſt in the air: this was the ſcene of their calamity, for of the magnificent Catania, there is not the leaſt foot-ſtep to be ſeen. We are aſſured by Bonajutus, that out of eighteen thouſand nine hundred and fourteen inhabitants, eighteen thouſand periſhed. And the ſame author finds, from a computation of the inhabitants before and after the earthquake, that there periſhed in the ſeveral cities and towns, near ſixty thouſand out of two hundred fifty-four thouſand nine hundred.

Jamaica has been always a place remarkable for earthquakes, and indeed they are ſo common, that the inhabitants expect one every year. Dr Sloan gives us the hiſtory of one in 1687, and we have accounts by ſeveral authors, of another more terrible one in 1692. In two minutes time, it ſhook down, and drowned nine tenths of the town of Port Royal. The houſes ſunk outright thirty or forty fathoms deep. The earth opened and ſwallowed up the people in one ſtreet, and threw them up in another; ſome roſe in the middle of the harbour, and yet

were

were ſaved. While the houſes on one ſide of a ſtreet were ſwallowed up, on the other they were thrown on heaps; and the ſand in the ſtreet riſing like waves in the ſea, lifted up every body that ſtood on it, and then ſuddenly ſinking into pits, and at the ſame inſtant a flood of water breaking in, rolled them over and over, ſome catching hold of beams and rafters, or whatever came in their way. Ships and ſloops in the harbour were overſet and loſt; and the Swan Frigate in particular, by the motion of the ſea and ſinking of the wharf, was driven over the tops of many houſes. All this was attended with a hollow rumbling noiſe, like that of thunder. In leſs than a minute, three quarters of the houſes and the ground they ſtood on, with the inhabitants, were all ſunk under water; and the little part left behind, was no better than a heap of rubbiſh. The ſhock was ſo violent, that it threw people down on their knees or their faces, as they ran about to ſeek a place of ſafety. The earth heaved and ſwelled like the rolling billows, and ſeveral houſes ſtill ſtanding, were ſhifted and moved ſome yards out of their places. A whole ſtreet was now twice as broad as before; and in many places the earth crack'd, open'd and ſhut, with a motion quick and faſt, and of theſe openings, two or three hundred might be ſeen at a time; in ſome of theſe the people were ſwallowed up, in others they were caught by the middle, and preſſed to death, and in others the heads only appeared The larger of theſe openings ſwallowed up houſes, and out of ſome, whole rivers of water ſpouted up a prodigious height into the air, threatning a deluge to that

part ſpared by the earthquake. And beſides of all the wells, from one fathom to ſix or ſeven, the water flew out at the top with a ſurprizing and irreſiſtable violence. The whole was attended with ſtenches and offenſive ſmells, and the noiſe of falling mountains at a diſtance, while the ſky, in a minute's time, was turned dull and reddiſh, like a glowing oven. Yet, as great a ſufferer as Port-Royal was, more houſes were left ſtanding in it, than on the whole iſland beſide. Scarce a planters houſe, or ſugar-work was left ſtanding in all Jamaica. A great part was ſwallowed up, houſes, people, trees, at one gape: in the room of which there afterwards appeared great pools of water, which, when dried up, diſcover'd nothing but ſand, without any mark, that ever tree or plant had been there. Two thouſand people loſt their lives, and had this terrible ſcene happened in the night, 'tis thought very few would have eſcaped: one thouſand acres of land were ſunk. One Hopkins had his plantation remov'd half a mile from its place. Yet the ſhocks were the moſt violent among the rocks and mountains, in whoſe caverns the matter that produced the earthquake was ſuppoſed to lie.

Not far from Yallhouſe, part of a mountain, after it had made ſeveral leaps or removes, overwhelm'd a whole family, and a great part of a plantation, tho' a mile diſtant; and a large high mountain near Port Morant, about a day's journey over, was quite ſwallow'd up, and in the place where it ſtood nothing remained but a lake of four or five leagues over. The tops of high mountains ſwept down with them

in

in their fall, trees and other things in there way; and theſe vaſt pieces of mountains with all their trees thereon, falling together in a confuſed manner ſtopp'd up moſt of the rivers for near twenty four hours, till ſwelling up they made themſelves new channels, tearing up in their paſſage every thing that oppoſed them, and carrying with them into the ſea ſeveral hundred thouſand tons of timber, floating in ſuch prodigious quantities that they ſeem'd like moving iſlands. In Liguania, the ſea retired from the land in ſuch a manner that for two or three hundred yards the bottom appear'd dry, and the fiſh were left behind; but in a minute or two's time it return'd again, and overflow'd great part of the ſhore. At Yallhouſe the ſea retired above a mile. After the violence of theſe convulſive throws were over, thoſe who eſcaped in the city of Port-Royal, got on board the ſhips in the harbour, where many continued above two months; the ſhakes all that time being ſo violent, and coming ſo thick, ſometimes two or three in an hour, attended with a frightful noiſe, reſembling a hollow rumbling thunder, with brimſtone blaſts, that they durſt not come on ſhore. The conſequence of this earthquake was a general ſickneſs, occaſioned by the vaſt quantity of noiſome vapours belch'd forth, which ſwept away about three thouſand perſons.

It is obſerved at Jamaica, that in windy weather there never happens a ſhock; but when the air is extraordinary calm, it is always expected: that after rain, the ſhocks are generally ſmarter than at other times, which may be cauſed by the

the ſhutting up the pores of the earth, whereby the force is more pent in, and hath not ſo free a paſſage to perſpire and ſpend itſelf. That ſince this earthquake, the land-breezes often fail, and, inſtead of it, the ſea-breezes blow all night; a thing ſcarcely known before, but ſince very common. In Port-Royal, and in many places all over the iſland, much ſulphureous combuſtible matter hath been found, which would flame and burn like a candle, upon the leaſt touch of fire. St. Chriſtophers, one of the Caribbee Iſlands, was formerly much infeſted with earthquakes, but upon the eruption of a great mountain of combuſtible matter, which ſtill continues burning, they have entirely ceaſed, and have never ſince been felt, which gave hopes that ſome ſuch eruption, in ſome of the mountains of Jamaica, would free that iſland from earthquakes.

Tho' the foregoing account is ſo very particular, yet the following abſtract of two letters from the Miniſter of Port-Royal, cannot be diſagreeable to our readers. The former gives ſcenes of public, theſe of private diſtreſs. They ſet the whole in a different light, and may ſerve to give us ſome idea in what manner the minds of the people of Jamaica were affected under this terrible ſtroke of providence †.

Dear Friend, *June* 22, 1692.

I Doubt not but you have heard of the dreadful calamity that hath befallen this iſland, by a ter-

† To avoid repetition, we have omitted many circumſtances mentioned in the above account.

a terrible earthquake on the 7th inſt. which hath thrown down almoſt all the houſes, churches, ſugar-works, mills and bridges in the Iſland.

On Wedneſday the 7th I had been at prayers, which I did every day ſince I was rector of Port Royal, to keep up ſome ſhew of religion amongſt a moſt ungodly and debauched people; and was gone to a place near the church, where the merchants uſed to meet, and where the preſident of the council then was.

To this gentleman's friendſhip, under the direction of the gracious and over-ruling will of povidence, I aſcribe my own happy, and I may add, miraculous eſcape; for by his preſſing inſtances I was prevailed upon to decline an invitation, which I had before accepted, to dine with Capt. Rudend, whoſe houſe upon the firſt concuſſion ſunk into the ſea, and with it his wife, his children, himſelf, and all that were with him, who every ſoul periſh'd in this general, this dreadful devaſtation. Had I been of the Number of his gueſts my fate had been involved in theirs. But, to return: we had ſcarce dined at the preſidents before I felt the earth begin to heave and roll under me. Said I, 'Lord, Sir, what's this?' He reply'd, very compoſedly, 'It is an earthquake, be not afraid, 'it will ſoon be over.' But it increaſed, and we heard the church and tower fall; upon which we ran to ſave ourſelves. I quickly loſt him, and made towards Morgan's Fort, which being a wide open place, I thought to be there ſecure from the falling houſes: but as I made towards

ards it, I ſaw the earth open, and ſwallow up a multitude of people, and the ſea mounting in upon us over the fortifications.

I then laid aſide all thoughts of eſcaping, and reſolved to make toward my own lodging, there to meet death in as good a poſture as I could. From the place where I was, I was forced to croſs and run through two or three very narrow ſtreets. The houſes and walls fell on each ſide of me: ſome bricks came rolling over my ſhoes, but none hurt me. When I came to my lodging, I found all things in the order I had left them. I then went to my balcony to view the ſtreet in which our houſe ſtood, and ſaw never a houſe down there, nor the ground ſo much as crack'd. The people ſeeing me, cry'd out to come and pray with them. When I came into the ſtreet, every one laid hold on my cloaths, and embraced me; ſo that I was almoſt ſtifled with their kindneſs. I perſuaded them at laſt to kneel down, and make a large ring, which they did; I pray'd with them near an hour, when I was almoſt ſpent with the heat of the ſun, and the exerciſe. They then brought me a chair, the earth working all the while with new motions and tremblings, like the rollings of the ſea, inſomuch that ſometimes when I was at prayers, I could hardly keep upon my knees.

By that time I had been half an hour longer with them, in ſetting before them their ſins and heinous provocations, and ſeriouſly exhorting them to repentance, there came ſome merchants

of

of the place, who desired me to go aboard some ship in the harbour, and refresh myself, telling me that they had a boat to carry me off. I found the sea had swallowed up the wharf, with all the goodly brick houses upon it, most of them as fine as those in Cheapside, and two entire streets beyond that. From the tops of some houses which lay level with the water, I got first into a canoe, and then into a long boat, which put me aboard a ship called the Siam-Merchant. There I found the president safe, who was overjoy'd to see me; I continued in it that night, but could not sleep for the returns of the earthquake almost every hour, which made all the guns in the ship to jar and rattle.

The next day I went from ship to ship, to visit those who were bruised and dying; likewise to do the last office at the sinking of several corps, which came floating from the point. This indeed, has been my sorrowful employment ever since I came aboard this ship: we having had nothing but shakings of the earth, with thunder and lightning ever since. Besides the people being so desperately wicked, it makes me afraid to stay in the place: for every day this terrible earthquake happened, as soon as night came on, a company of lewd rogues, whom they call privateers, fell to breaking open warehouses, and houses deserted, to rob and rifle their neighbours, while the earth trembled under them, and the houses fell on some of them in the act: and those audacious whores who remain still upon the place, are as impudent and drunken as ever.

I have been twice on ſhore to pray with bruiſed and dying people, where I met too many drunk and ſwearing. I did not ſpare them, nor the magiſtrates neither, who have ſuffered wickedneſs to grow to ſuch a height. I have, I bleſs God to the beſt of my ſkill and power, diſcharged my duty in this place. In the laſt ſermon I delivered in the church, I ſet before them what would be the iſſue of their impenitence and wickedneſs ſo clearly, that they have ſince acknowledged it was more like a prophecy than a ſermon. I had, I confeſs, an impulſe on me to do it; and many times I have preached in this pulpit, things, which I never premeditated at home, and could not, methought, do otherwiſe.

The day when all this befel us was very clear, and afforded not the ſuſpicion of the leaſt evil; but in the ſpace of three minutes, about half an hour after eleven in the morning, Port Royal, the faireſt town of all the Engliſh plantations, the beſt emperium and mart of this part of the world, rich, plentiful of all good things, was ſhaken and ſhattered to pieces, ſunk, into, and covered for the greater part by the ſea; few of the houſes are left whole, and every day we hear them fall.

I came on board this ſhip in order to return home: but the people are ſo importunate with me to ſtay, that I know not what to ſay to them. I muſt undergo great hardſhips if I continue here, the country being broke all to pieces and diſſet-

tled

tled : but it looks very unnatural to leave them in their diſtreſs ; and therefore, whatever I ſuffer, I would not have ſuch a blame lie at my door ; ſo that I am reſolved to ſtay a year longer.

SECOND LETTER.

June 28, 1692.

EVER ſince that fatal day, the moſt terrible that ever I had in my life, I have lived on board a ſhip ; for the ſhaking of the earth returns every now and then. Yeſterday we had a very great one ; but it ſeems leſs terrible on ſhip board than on ſhore ; yet I have ventur'd to Port-Royal no leſs than three times, among the ſhattered houſes, to bury the dead, pray with the ſick, and chriſten the children. Sunday laſt I preached among them in a tent, the houſes which remain, being ſo ſhattered, that I durſt not venture in them. The people are overjoy'd to ſee me among them, and wept bitterly as I preached. I hope by this terrible judgment, God will make them reform their lives ; for there was not a more ungodly people on the face of the earth.

It is a ſad ſight to ſee this harbour, one of the faireſt I ever ſaw, covered with the dead bodies of people of all conditions, floating up and down without burial ; for our burying place was deſtroy'd by the earthquake ; which daſhed to pieces the tombs, the ſea waſhed the carcaſſes of thoſe who had been buried, out of their graves. We have had accounts from ſeveral parts of

this iſland, but none ſuffered like Port-Royal, where whole ſtreets, with their inhabitants, were ſwallowed up by the opening of the earth, which when ſhut in upon them, ſqueezed the people to death. And in that manner ſeveral are left with their heads above ground; only ſome heads the dogs have eaten; others are covered with duſt and earth, by the people, who yet remain in the place, to avoid the ſtench.

Thus I have told you a long ſtory; and God knows what worſe may happen yet. I am afraid to ſtay, and yet know not how, in point of conſcience, at ſuch a juncture to quit my ſtation. *I am, Sir, Yours,* &c.

The piety and humanity of this worthy divine, deſerves the higheſt praiſes, but let us turn our thoughts from the unhappy fate of Jamaica, at that time a * young Britiſh ſettlement laid in ruins, to take a view of calamities, in which we are not quite ſo nearly concerned.

Peru has been long famous for earthquakes; but no part of this vaſt country has ſuffered more than Lima. On *Monday, Oct.* 20, 1687. The inhabitants of this city felt a very terrible ſhock, which threw down ſome houſes, and buried ſeveral perſons under their ruins, an hour after, there was another, and at ſix o'clock, a third, which came with great fury and ruſhing noiſe.

* It had been in the hands of the Engliſh about thirty years.

The ſea with hideous roaring, ſwelled beyond its bounds, the bells rang of themſelves, and the deſtruction was ſo great, that no building was left ſtanding. Five other cities were entirely ruined; at Lima alone, above five thouſand dead bodies were found.

Between this earthquake and the laſt, Lima has ſuffered a variety of others, and ſome of the moſt dreadful and fatal kind, in which very few lives were ſpared; and particularly one in 1709, which not only deſtroy'd, but almoſt depopulated the city.

The laſt, which is in every body's memory, happen'd on the 28th of *October* 1746, and began at thirty minutes after ten at night. The ſuddenneſs of the deſtruction did not ſo much as give time for a fright, for the noiſe, the ſhock and the ruin were perceived together, and almoſt at the ſame inſtant: ſo that in the ſpace only of four minutes, during which, the greateſt force of the earthquake laſted, ſome found themſelves buried under the ruins of the falling houſes; and others while they ran here and there in wild confuſion, were cruſhed to death in the ſtreets. The greateſt part however of the inhabitants were preſerved, either in the hollow places left by the ruins, or on the tops of the very ruins themſelves, even without ſo much as their knowing how they got up thither. No perſon had then time for deliberation: no perſon had a place that he could call a retreat: and no perſon could flatter himſelf with a ſhad-

dow

dow of ſafety, till he was out of the city. Men were loſt and tranſported from one place to another, and while this was a means of ſafety to ſome, the impoſſibility of moving preſerved others. Out of three thouſand houſes in the city, beſides thoſe in the ſuburbs, or borough of St Lazarus, ſufficient to contain ſixty thouſand people, (the number computed to reſide conſtantly in the city,) ſcarce twenty houſes were left ſtanding, and yet, by the providence of God, and the vigilence and humanity of the viceroy, after the moſt diligent ſearch it does not appear, from the liſt taken of the dead, that the number has amounted to much more than eleven hundred and forty perſons*. The fine cathedral church, was deſtroyed by its own greatneſs; for its high towers ſplit to pieces, and tumbled on its roof, and utterly demoliſhed the building. Before this dreadful cataſtrophy; there were ſtanding ſeventy-four churches, beſides public chapels, fourteen monaſteries, and as many more hoſpitals, the fineſt paintings, lamps and veſſels of †ſilver, the moſt curious works in gold, vaſt quantities of jewels, and ſervices of wrought plate, were loſt and confounded in mountains of ruin; And this late beautiful city, the largeſt

* One great reaſon of there being ſo few lives loſt in ſo violent a convulſion of nature, may be the lowneſs of the houſes, and the lightneſs of the roofs, moſt of them, being only one ſtory high, and as it never rains there, their houſes are only covered with a ſingle mat, laid flat, and the thickneſs of a finger of aſhes, to ſuch up the moiſture of the dews.

† The moſt common utenſils in their houſes were of this metal, even the frames of their glaſſes, pictures, tables, and chairs, were many of them of ſolid ſilver.

of

of all South America, with the palace of the viceroy, the courts of juſtice, the royal univerſity, mint, the treaſury, the public ſtatues and fountains, and every thing that could contribute to the pleaſure of the beholder, changed to a dreadful ſcene of deſolation and horror.

But dreadful as the ruin of Lima may appear, the greateſt number of inhabitants live, and its remains ſtill ſhew its former magnificence, while thoſe of the port of Calao, but two leagues diſtant, are vaniſhed out of ſight. It is become a ſpacious ſtrand, not the leaſt ſign of its former figure appears, but vaſt heaps of gravel and ſand, covered the place where it lately ſtood. Part of its walls, and ſome few towers, for a time endured the force of the earthquake, and ſtood firm, notwithſtanding the violence of its ſhocks; but ſcarcely had the wretched inhabitants recovered from the firſt horror of their fright, when ſuddenly the ſea began to ſwell, and riſing like mountains, to ruſh furiouſly forwards, and to overflow with a vaſt deluge of water, its ancient bounds, ruſhing into the town, and tearing up from the foundations, houſes, public buildings, and every thing that oppoſed its paſſage, the greateſt part of the ſhips that were at anchor in the port, were foundered, and the reſt being elevated above the walls and towers, were drove by the violence of the torrent on dry ground, far beyond the town. So that all was deſtroy'd except two gates, and ſome pieces of wall, which were left as dreadful monuments of this fatal calamity. In this raging flood according to the exacteſt computation,

near

near five thouſand perſons were drowned, while thoſe who were ſaved, by laying hold of ſome pieces of timber did not exceed two hundred: and of twenty three ſhips, great and ſmall that were lying at anchor, four were ſtranded, and all the reſt foundered. Freſh ſhocks were every day felt at Lima, and the neighbouring country during the whole month of *November*.

As I have already ſhewn the ſtrict conformity between the nature of earthquakes and volcano's, and that the latter are ſo many ſpiracles or vents, ſerving for the diſcharge of the ſubterraneous fire, I ſhall now turn the eyes of my readers to new ſcenes of horror, to the view of burning oars and cinders, to clouds of ſulphureous ſmoak and fires, to torrents of boiling mettles, driven from their beds and overſpreading the land with wide and horrid deſolation.

The eruptions of mount Ætna and Veſuvius, are obſerved to be ſomewhat periodical, the one leſs violent, happening once in two or three months, and laſting uſually three or four days, without much damage to the adjacent country, and the other more furious, and of longer continuance, happening to mount Veſuvius about once in eighty years. Theſe indeed, muſt be extremely violent, ſince, according to Peccacio's niceſt obſervations that in * 1632, caſt the rocks three miles into the air.

Of theſe eruptions we have very early, as

* See *Philoſopical Tranſactions*, N° 202.

well

well as very numerous and dreadful accounts; from which, it will be ſufficient to mention only a few inſtances, in order to give you ſome idea of the whole.

I ſhall begin with that deſcribed by Pliny, in two letters to Tacitus, of which he was an eye witneſs, and which began on the 23d of *Auguſt*, A. D. 79. He was at that time with his uncle, who commanded a fleet which lay at Meſſina, in the gulf of Naples. About one in the afternoon his uncle was called from his ſtudy to obſerve a cloud of an unuſual form and magnitude, and reſembling nothing ſo much as a pine tree, for it ran up a great height, ſtreight like the trunk, and dilated itſelf like the branches, appearing ſometimes white, and ſometimes ſooty, with darker ſpots, as it carried up either more or leſs of the earth or aſhes. His uncle's curioſity determined him to take a nearer view of this extraordinary phœnomenon, he therefore ordered a light veſſel to be got ready, but receiving a meſſage from the maritime people at Reſina, intreating him to deliver them from that imminent danger, as their ſituation near the foot of the mountain, cut off all hopes of eſcaping, but by ſea. On this, his curioſity gave way to his humanity, and he immediately ordered all the gallies to put to ſea, haſtened to the place from whence others fled with the utmoſt terror, and ſteer'd directly to the point of danger. He was now ſo near the mountain, that the aſhes which grew thicker and hotter, the nearer they approached, fell into the gallies, together with the pumice ſtones, and black

pieces of burning rock : they were alſo in danger, not only of being left a-ground, by the ſudden retreat of the ſea, but from the vaſt fragments which rolled down from the mountain, and obſtructed all the ſhore, ſo as to prevent their landing. Here he ſtopped to deliberate on returning to Meſſina, to which the pilate adviſing him, *fortune*, ſaid he, *befriends the brave* ; *carry me to Pomponianus*. That officer was, with ſome gallies on the other ſide of the bay. Pomponianus had ſent his baggage on board, intending if it ſhould increaſe, and the wind ſhould change, which was then contrary, to put to ſea. Pliny ſays, that his uncle endeavoured to remove the apprehenſions of his friend ; but while they were at ſupper, the eruptions from Veſuvius flamed afreſh in different places, and were rendered the more horrible and alarming by the darkneſs of the night ; when in order to comfort him, he ſuggeſted that this great light was only the burning of the villages, deſerted by the terrified people, and then lay down to reſt : but the area belonging to the houſe, being almoſt filled with cinders and aſhes, he was awaked, leſt by a longer ſtay the avenues ſhould be blocked up. He aroſe, and went to Pomponianus and his friends, and conſulted with them, whether they ſhould truſt to the houſes, which were ſhaken to and fro, or go into the open fields, where the cinders and burnt ſtones, tho' not heavy, fell in great abundance. On which they reſolved for the fields, and went out, after tying upon their heads pillows for their defence. It was now day every where elſe, but there, as dark as the darkeſt night ; ſo that they were

obliged

obl g:d to proceed by the help of torches. They thought proper to go down to the ſhore, to ſee if they might ſafely get on board the gallies, but found the ſea very boiſterous, and the wind ſtill contrary. Here his uncle repoſed himſelf on a quilt. Immediately the flames and a ſtrong ſmell of ſulphur diſperſed the reſt, and obliged him by the help of his two ſervants to ariſe, which he had no ſooner done, than ſuffocated with the noxious vapours, he fell down dead.

During all this time, Pliny and his mother remained at Meſſina. There had been for many days a ſhaking of the earth, which was the leſs terrifying, as it was a common thing in Campania; but that night it was ſo violent, as not only to move houſes and caſtles, but to threaten total ruin. Tho' it was now morning, the light was exceeding faint and languid; the buildings all around them totter'd, and there was no ſtaying without danger: they therefore reſolved to quit the town. The people followed in the utmoſt conſternation, and, as to a mind diſtracted with terror, every ſuggeſtion ſeems more prudent than its own, they preſſed about them in great crowds in their way out. Being got at a convenient diſtance from the houſes, they ſtood ſtill in the midſt of a dreadful ſcene of danger. The chariots which they had ordered to be drawn out, were ſo agitated backwards and forwards, tho' upon the moſt level ground, that they could not be kept ſteady. The ſea ſeemed to roll back upon itſelf, and to be driven from its banks by the convulſive motions of the earth: while the ſhore was conſiderably enlarged, and ſeveral ſea-animals left upon it. On the other ſide a black

and dreadful cloud burſting, with an igneous ſerpentine vapour, darted out a long train of fire, reſembling flaſhes of lightning, but much larger. This cloud preſently ſeemed to deſcend and cover the whole ocean, when the tender mother entreated, and even commanded her ſon to make his eſcape, and to leave her willingly to meet her death; but Pliny abſolutely refuſed, and taking her by the hand, led her on; while ſhe complied with reluctance, and not without many reproaches to herſelf, for retarding his flight. The aſhes now began to fall upon them, tho' in no great quantity. He turned his head, and obſerved a thick ſmoke, which came rolling after them like a torrent. On which he propoſed, that while they had yet light, they ſhould turn out of the high-road, leſt they ſhould be preſſed to death in the dark, by the crowd that followed them. And indeed they had ſcarce left the path, when a darkneſs overſpread them, not like that of a cloudy and moonleſs night, but of a room cloſe ſhut, and all the lights extinguiſhed. Nothing then was to be heard but the ſhrieks of women, the ſcreams of children, and the cries of men; ſome calling their children, ſome their parents, ſome their huſbands, and only diſtinguiſhing each other by their voices; one lamenting his own fate, another that of his family; ſome wiſhing to die from the very fear of dying; and others lifting up their voices in prayers; whilſt the greater part imagined the laſt eternal night was come. At length a glimmering light appeared, which they imagined to be rather the fore-runner of an approaching burſt of flames, (as in truth it was)

than

than the return of day: however, the fire fell at a diſtance from them: then they were again immerſed in thick darkneſs, and a heavy ſhower of aſhes rained upon them; which they were obliged every now and then to ſhake off, otherwiſe they would have been buried with the weight. I might boaſt, ſays our author, that during all this ſcene of horror, not a ſigh or expreſſion of fear eſcaped from me, had not my ſupport been founded in that miſerable, tho' ſtrong conſolation, that all mankind were involved in the ſame calamity, and that I imagined I was periſhing with the world itſelf. At laſt, this dreadful darkneſs diſſipated by degrees like a cloud; the real day returned, and even the ſun appeared, tho' very faintly, when every object which preſented itſelf to their eyes (which were extremely weakened) ſeemed changed, being covered over with white aſhes, as with a deep ſnow, &c. They returned to Meſſina, where they ſtay'd in the utmoſt danger, till the eruption ceaſed. The Univerſal Hiſtory tells us, that by this eruption Pompeii, Herculaneum, and many other cities, with their inhabitants, were deſtroyed, and that the aſhes reached Africa, Egypt, and Syria, and at Rome day was turned into night.

Since that time to the preſent, there have happened ſeveral ſucceſſive eruptions. That in 1631, was one of the moſt dreadful that ever happened, and has left behind it marks of its fury, which are viſible to the preſent age. The red hot Stones, and other fiery ſubſtances, which it threw out, burnt up trees, deſtroyed all the neighbouring villages, and ſet the country in a flame.*

flame.* Seven villages were entirely ruined by a torrent of liquid fire, and near ten thouſand perſons periſhed either by the aſhes or the flames. Since that time, the eruptions have been more frequent; but, in return, they have been much leſs violent and deſtructive.

I ſhall now give my readers a view of the inſide of this dreadful Volcano, at a time when it was in ſome agitation; by which they will be better able to form an idea of the eruption, and will have nothing to do but to imagine it cloſed up, to account for earthquakes the moſt violent and terrible.

April 27, 1717. The ingenious Mr Berkely with much difficulty reached the top of Mount Veſuvius, in which he obſerved a vaſt aperture full of ſmoke, which hinder'd his ſeeing its depth and figure; he heard within that horrid gulph, certain odd ſounds, which ſeemed to proceed from the belly of the mountain, as alſo a ſort of murmuring, ſighing, throbbing, churning and daſhing of waves, and at times a noiſe like that of thunder or cannon, which was conſtantly attended with a clattering, like that of tiles falling from the tops of houſes into the ſtreets: ſometimes as the wind changed, the ſmoke became thinner, diſcovering a very ruddy flame, and the jaws of the pan, were ſtreaked with red and ſeveral ſhades of yellow. After an hour's ſtay, the ſmoke being moved by the wind, afforded ſhort and partial proſpects of the great hollow; in the flat bottom of which, Mr Berkely could diſcern two furnaces almoſt con-

* See the natural Hiſtory of Mount Veſuvius.

tiguous;

tiguous; that in the left ſeeming to be about three yards in diameter, glowed with red flame, and threw up red hot ſtones with a hideous noiſe, which as they fell back, cauſed the above-mentioned clattering.

May 8. In the morning, Mr Berkeley went up a ſecond time to the top of Veſuvius, and found a different face of things; the ſmoke aſcending upright, gave a full proſpect of the opening, which, as near as he could judge, was about a mile in circumference, and a hundred yards deep. A conical mount had been formed ſince his laſt viſit, in the middle of the bottom; this mount, he could ſee, was formed of the ſtones thrown up, and had fallen back again; in this new hill there remained the two mouths or furnaces already mentioned, that on the left hand, was in the top of the hill, which it had formed round it, and raged more violently than before, throwing up every three or four minutes, with a dreadful bellowing, a vaſt many red hot ſtones, ſometimes, in appearance, upwards of a thouſand, and at leaſt three hundred feet higher than his head, as he ſtood upon the brink; but there being little or no wind they fell back perpendicularly into the crator, increaſing the conical hill; the other mouth to the right was lower in the ſide of the ſame new formed hill: Mr *Berkeley* could diſcern it to be fill'd with red-hot liquid matter, like that in the furnace of a glaſs-houſe, which raged and wrought like the waves of the Sea, cauſing a ſhort abrupt noiſe, like what may be imagined to proceed from a ſea of quickſilver, daſhing among uneven rocks:

this

this ſubſtance would ſometimes overflow and run down the convex-ſide of the conical hill, and appearing at firſt red-hot, it changed colour, and hardened as it cooled, ſhewing the firſt rudiments of an eruption, or as it were an eruption in miniature. Had the wind driven directly in the ſpectators faces, they had been in no ſmall danger of being ſtifled by the ſulphurous ſmoke, or being knock'd on the head by the lumps of molten minerals, which were ſeen ſometimes to fall on the brink of the crator, but as the wind was favourable, Mr *Berkeley* had an oppertunity of ſurveying this odd ſcene for above an hour and a half together, during which time it was very obſervable, that all the vollies of ſmoke, flame and burning ſtones, came only out of the hole to the left, while the liquid matter in the other mouth wrought and overflow'd as has been already deſcribed. *June* the 5th, after a horrid noiſe the mountain was ſeen at *Naples* to diſgorge a little of the liquid mettle. On the the 7th nothing was obſerved till within two hours of night, when it began a hideous bellowing, which continued all that night and the next day till noon, cauſing the windows, and as ſome affirm'd, the very houſes in *Naples* to ſhake; from that time it belched out vaſt quantities of molten matter to the ſouth, which ſtreamed down the ſide of the mountain, like a large pot boiling over: this evening Mr *Berkeley*, returning from a journey thro' *Apulia*, was ſurpriſed upon paſſing to the north-ſide of the mountain; to ſee a great quantity of ruddy ſmoke, cover a long and large tract of ſky over the river of molten matter,

which

which was itſelf out of ſight. On the 9th Veſuvius raged leſs violently, and that night a column of fire was ſeen from Naples to ſhoot at times out of its ſummit. The 10th when it was thought all would have been over, the mountain grew very outrageous again, roaring and groaning moſt dreadfully: This noiſe in its moſt violent fits was like a mix'd confuſed ſound, made up of the raging of the tempeſt the murmuring of a troubled ſea, and the roaring of thunder and artillery; it was very terrible as heard in the farther end of Naples, at above the diſtance of twelve miles; this moved Mr Berkeley's curioſity to approach the mountain; and for this end he, and three or four others got into a boat, and were ſet a ſhore at Terre del Greco, a town ſituated at the foot of Veſuvius to the ſouth-weſt, where they mounted their horſes and rode four or five miles, before they came to the burning river, at which they arrived about midnight: the roaring of the Vulcano grew exceeding loud and horrible as they approach'd. Mr Berkeley obſerved a mixture of green, yellow, red, and blue, in the cloud over the crator; there was likewiſe a ruddy diſmal light in the air over that tract of land where the burning river flow'd; aſhes continually ſhowered upon them all the way from the ſea coaſt; all which circumſtances, together with the horror and ſilence of the night, made a ſcene the moſt uncommon and aſtoniſhing, and which grew ſtill more extraordinary, the nearrer they came to the ſtream, reſembling a vaſt torrent of liquid fire rolling from the top down the ſide of the mountain, and with irre-

ſiſtible fury bearing down and conſuming every thing that ſtood in its way. This mighty flood divided into two different channels according to the inequalities of the mountain; the largeſt ſtream ſeemed half a mile broad at leaſt, and five miles long. Mr Berkeley walked ſo far before his companions up the mountain along the ſide of the river of fire, that he was obliged to retire in great haſte, the ſulpherous ſteam having ſurpriſed him, and almoſt taken away his breath.

During their return, which was about three o'clock in the morning, they conſtantly heard the murmuring and groaning of the mountain, which, at times, would burſt out into louder peals, throwing up huge ſpouts of fire and burning ſtones, which falling down again, reſembled the ſtars in rockets. Sometimes he obſerved two, and at other times three diſtinct columns of flames, and ſometimes one vaſt column, which ſeemed to fill the whole crator: theſe burning columns and the fiery ſtones ſeemed to be ſhot a thouſand feet perpendicular above the ſummit of the vulcano. Thus it continued till the 18th, when, after ſeveral flaſhes of lightning iſſuing out of the mouth, the whole appearance ended, the mountain remained perfectly quiet, without any viſible ſmoke or flame.

It is worth remarking, that Mr Berkeley obſerved the fluid matter riſe out of the bottom of the crator.

The only circumſtance, which here ſeems to differ

differ from the former accounts of earthquakes, is, that of the molten minerals flowing in ſuch prodigious quantities from the mountain. But the curious obſerver has given ſuch lights, as may enable an attentive reader to reſolve the difficulty, with a great degree of certainty. Some time before the eruption, this molten matter was ſeen boiling, breaking into waves, and agitated in a very extraordinary manner; nature was then preparing for this great event. The two mouths, or furnaces were beyond all doubt the openings of two canals or veins leading to ſome caverns, filled with inflammable vapour, and from that which diſgorged flame and red hot ſtones, the eruption in all probability was chiefly produced. An eruption which preſerved the country from the moſt dreadful earthquake. Theſe red hot ſtones caſt forth from the caverns in ſuch quantities, and forming the conic mount, were doubtleſs the pyrites, with which this mountain abounds, and which being ſufficiently burnt, at laſt diſſolved into a yellow fluid ſubſtance, compoſed of melted iron and ſulphur, leaving nothing behind but pumice ſtones and aſhes, which there lying in a heap, muſt greatly promote, eſpecially when aſſiſted by the wind, or inflammable vapour, which ſtreaming forth with rapidity from the furnaces, or necks of the caverns, and which, to compare very ſmall things, to things vaſtly great, anſwered the ſame purpoſe as the bellows in a ſmelting furnace, muſt ſoon encreaſe the heat of the fire to ſuch a degree as to draw metals from their ores, * to melt the ſtones, ſand, earth,

* To evince the truth of this reaſoning, I ſhall inſert a paſ-

earth, and every thing within its reach, eſpecially as this mountain is plentifully ſtored with thoſe ſalts which are proper to promote the fuſion. Thus the whole was ſet in motion, a ſtronger heat was in return convey'd to the caverns, which would ſoon be filled with the hot liquid ſubſtance, and this, both encreaſing the exhalations, and preſſing on the interior air, would ſoon be repulſed with violence and driven forwards thro' the veins of the caverns with the utmoſt velocity, ſo as to produce ſpouts of the

---

ſage from the hiſtory of Mount Veſuvius. We may then conclude, ſays the author, that our Veſuvian torrents are compoſed either of metals, or inflammable minerals or ſtones, or other bodies ſubject to fuſion. or rather perhaps by a mixture of all theſe together. That our fluids are wholly metallic, is contrary to evidence, for we know all metals are malleable bodies, that is, ſubject to bend under the hammer without breaking, a property not to be found in our Lavangi, for chuſe what piece you will, it will fly in pieces, rather than yield to a violent blow. If our torrents are not purely a compoſition of metals, much leſs are they an entire mixture of ſalts, ſulphur, bitumen, or other inflammable minerals, for neither the exceſſive hardneſs, nor the heavineſs of our Veſuvian torrents, agree with the nature of ſuch a mixture. Laſtly, if our torrents were only ſtones diſolved, or other vitrified bodies, how ſhould we find in them the ſtrata of different metals, or ſee them intermingled with talc and ſalts of all kinds, with an incredible quantity of ſulphur. This laſt is prodidigious, and no doubt, the reaſon why ſeveral apertures of our laſt torrent emitted hot and miſty vapours, which condenſing round the adjacent rocks, encruſt them ſo as to be diſtinguiſh'd at firſt view. Let us then allow that our Veſuvian fluids are a mixture of all theſe together: compoſed of metals, perfect and imperfect, minerals, ſtones, and other ſubſtances, all vitrified by the action of a violent fire, together with a fat bitumenous ſubſtance, which we may call rock oil, and of this Veſuvius ſeems to contain an inexhauſtible fund. *Nat. Hiſt. Mount Veſuvius, p.* 134, 135, 136, 142.

minerals

minerals with which they were filled, ſheets or ſtreams of fire, and dreadful exploſions of the ſtones, aſhes and cinders.

The eruptions of Mount Ætna were much earlier than thoſe of Veſuvius; and, indeed, they have been both numerous and terrible. One of the moſt remarkable broke out on the 11th of March, 1669, about two hours before night: on the ſouth-eaſt ſide of the mountain, about thirty miles from the old mouth, and ten from the city of Catania. It was preceded, for the ſpace of eighteen days, with a dark thick ſky, thunder, lightning, and frequent cencuſſions of the earth. The matter here yielded was a ſtream, or river, of metals and minerals, render'd liquid by the fierceneſs of the fire, and boiling up, and guſhing forth, as water does at the head of ſome great river; 'till having run in a full body, for a ſtone's caſt, or more, the extremity thereof began to cruſt and curdle, and turn'd, when cold, into hard porous ſtones, reſembling ſea-coal, full of a fierce fire. Theſe came rolling and tumbling over one another, and where they met a bank, wall, building, *&c.* would fill up, and ſwell over, by their weight bearing down any common building, and burning up what was combuſtible. The progreſs of this inundation was, at firſt, at the rate of three miles in 24 hours: but afterwards it advanced only a furlong a day, which it continued for fifteen or twenty days, running at firſt into the ſea; but after having overwhelmed fourteen towns and villages, on the 14th of May, it ſurrounded, and even mounted to the top of the walls of Catania. But at the moment

ment when the inhabitants were in the dreadful expectation of ſeeing their city immediately in ruins, a ſtop was put to their imminent danger, and the city ſaved. The noiſe of this eruption was heard ſixty, and in ſome places an hundred miles off, to which diſtance the aſhes were alſo carried; and ſeveral ſeamen affirmed their decks had been cover'd with them at Zant.

I have now given a hiſtory not only of Earthquakes in our own country, but of the moſt conſiderable of thoſe abroad; together with a ſhort account of the hiſtory of vulcanos; from a tranſient view of which we muſt immediately ſee how highly this iſland has been favoured above other parts of the world.——But here let me ſtop. What gratitude have we ſhewn for this diſtinguiſhing mercy? We have hitherto been ſo happy as to behold, at a diſtance, the evils which others have ſuffered; or rather have, in ſafety, only heard of thoſe dreadful throws of nature which others have both ſeen and felt. But what return have we made to God?----Return, do I ſay? we can make no return to him: he requires none; our grateful love, our humble obedience, is all that he requires. But abandon'd, wicked, and diſſolute as we are now grown, what may we not expect from the reſentment of injured mercy and abuſed goodneſs?

Is the Atheiſt ſtill harden'd in his unaccountable infidelity? Does he ſtill boaſt, ſtill make uſe of his reaſon to prove that it was given him in vain? Does he ſtill plume himſelf on being upon a level with the brutes that periſh, and

that

that he has no title to the glorious privilege of being immortal? O that this were not the caſe: but it is no wonder that he who is ſo blind as not to perceive the finger of God in the regular productions of nature, ſhould be unconvinced by its convulſions; theſe men are incapable of being wrought upon by the ſtrength of evidence But didſt thou, who haſt been uſed to make a mock of every thing ſacred, find thy profane gaiety of heart unſhaken? Did no diſtreſsful dread intrude upon thy mind, when the earth trembled under thee? Did no apprehenſions ariſe to diſturb thy mirth? no diſtruſt that thy principles were unſolid? no fears of an awful futurity on the poſſibility of ---- O dreadful thought!----the poſſibility of damnation? If there did, or if, upon a review of thy heart, thou haſt reaſon to believe that the proſpect of more violent agitations, the ſight of the earth gaping and ſwallowing thouſands, would have this effect, O repent before it be too late; begin to recollect thy ſcatter'd, confus'd and bewilder'd thoughts; be no longer deaf to the ſtrongeſt evidence; own the ſecret hand that ſupports thee; bleſs the bounty of heaven; and owning that thou art a man, and not a brute, or a machine, live as thoſe ſhould live, who know that they are immortal.

The growth of deiſm is a ſubject that muſt ſurely give every ſincere Chriſtian the deepeſt concern. There is not a nation upon earth in which liberty is carried to ſuch an extreme of licentiouſneſs. Impiety has, of late years, become ſo faſhionable, men without any real prin-

ciples, from an affectation of ſingularity, take up the name of Deiſts, tho' by their whole conduct they make it too evident that they have not the leaſt regard to natural religion. They talk againſt prejudice, whilſt themſelves are fill'd with the ſtrongeſt prejudices; and, without the leaſt regard to decency or good manners, are ſure to diſplay their low wit wherever they appear, by common-place raillery, and contemptible jeſts on the moſt ſacred and important truths. And theſe are utter'd in ſuch a manner as to be an affront to every man who has the leaſt regard for the honour of God; or the leaſt degree of love for the Saviour of mankind. Can we expect the continuance of the mercies of God, when his providence and laws are, almoſt in every company, treated with contempt? I am neither an enemy to free enquiry, nor to plainneſs of ſpeech. The religion that will not bear an examination is not worth defending: I plead not therefore for a blind credulity: I would not have you believe without evidence. All that I wiſh is, that I could prevail upon you to baniſh your prophane levity; ſoberly to re-examine your principles; with coolneſs and impartiality to ſearch again into the evidences of Chriſtianity; and, with an earneſt deſire of diſcovering the truth, to aſk your own hearts, if you are better men ſince you have ceaſed to be Chriſtians. The important time will ſoon come, when you will ſtand before an awful, a deciſive tribunal; a tribunal where a love of truth, a good intention, and integrity of heart, will doubtleſs atone for errors in judgment, and receive a reward from that

God

God who knows the extent and limits, and will make allowances for the weakneſs of human underſtanding. But let him who ſuffers himſelf to be laugh'd out of his religion; let him who, thro' a biaſs to vice, conceives a prejudice againſt the truth; let him who diſcards chriſtianity without the ſtricteſt, the moſt cool and unprejudiced enquiry into the brightneſs of its evidence; let theſe, I ſay, tremble and be ſtruck with amazement. How will they be able to ſtand at that awful bar, and face the majeſty of that judge who knows the baſe, the ſecret motives from whence they have inſulted him, and trifled with, if not ridicul'd, the offers of his mercy.

Nothing is now more common than to hear even Chriſtians deny the interpoſition of a particular providence; a doctrine inculcated in the ſtrongeſt terms by our Lord himſelf; a doctrine which ſhines almoſt in every page in the New Teſtament; and thus the good man's hope is ſnatch'd away, and the miſerable depriv'd of the trueſt comfort: whilſt the warm gratitude that ſhould ariſe from private bleſſings, and the favours heap'd on their friends, their kindred, their country, is, if not entirely extinct, ſpread into a too diffuſed, and, conſequently, a cold and lifeleſs acknowledgment: but where is the abſurdity of ſuppoſing that God has ſtill, even in this world, left it in his power to puniſh the wicked and rebellious? The very favours of heaven, when abuſed, become a puniſhment; what was given for the comfort and ſupport of life gives death to the epicure: thus, by a juſt

analogy, it is fit that the exhalations that have contributed to clothe our land with the richeſt plenty, ſhall, when we are drunk with the mercies theſe, under the influence of heaven, have loaded us with, burſt the earth, throw all nature into convulſions, and leave this land of liberty a ſcene of deſolation and horror.

Heaven has already threatened us in the ſickneſs of our cattle, with the dreadful ſcourge of want and famine. Has this awaken'd us to repentance? It has not: we are ſtill hardened; ſtill inſenſible; ſtill unmoved both by the mercies and threatenings of God. And let us judge by our ſins of the heavier judgments we have room to expect.

By the extent of the two late ſhocks of an earthquake, it ſeems as if London and Weſtminſter with their ſuburbs, were principally threatened with deſtruction. London and Weſtminſter were violently ſhaken, and may, in ſome degree, be conſidered as the center of the motion. London and Weſtminſter, which together compoſe one of the largeſt and moſt opulent cities in the world, the metropolis of a wealthy kingdom, and the ſeat and repoſitory of the wealth of the nation; and, oh! that I could not call it, the metropolis, the center, the ſeat of vice, the moſt corrupt part of the nation; the place where infamy appears almoſt without a maſk, where it ſhews its hardened face, fronts the broad day-light, and appears without a bluſh. Where, as if vice was the higheſt honour, it is faſhionable for men

to

to glory in their ſhame, and even impudently to boaſt of crimes they have never committed; where a modeſt man is a ſubject of ridicule, a ſtanding jeſt, and if he has the reſolution to acknowledge that he has a regard to virtue, that while unmarried he has the courage to be ſo unfaſhionable as not to hazard his damnation by lewdneſs, he can ſcarcely do it without a bluſh. A man, and chaſte! The very women laugh him to ſcorn. Good God! how indulgent is thy mercy, that has ſo long preſerved theſe guilty, theſe abandon'd cities! The very women, in ſpite of their native modeſty, make a public and open trade of vice. Theſe birds of prey, who formerly, as if conſcious of their guilt, ſeldom appeared but like the owls of the night, now ſhow themſelves in the face of day, and at all hours lie in wait for unwary youth. Theſe know not what it is to bluſh; they are ſtrangers to ſhame; they, therefore, as if in defiance of heaven, make a trade of ſin, and live for no other end but to be the tools of the devil, to portion out diſeaſes and death, and to fit men for damnation. Yet, notwithſtanding the beſt form of government, and the beſt laws, theſe throng our ſtreets, and go on unpuniſh'd, even in a chriſtian city, and appear with as much effrontery as if protected by the laws themſelves. Theſe abandoned, theſe unhappy wretches are, however, worthy of the care and pity of the legiſlature. Can no way be found to ſupport and render ſerviceable to the public thoſe who, ſpurr'd on by want, are tempted to live by the ſale of honour and conſcience? If not, well may we expect that our ruin is at hand.

That hoſpitality, for which this country was formerly famous, has been long fled, and now humanity ſeems to be following after. That blunt honeſty, which diſtinguiſh'd us and our dealings, now ſeems on the decline, and to give way to low artifices and mean tricks in trade. So that a ſhop-keeper, who even makes a ſhow of Religion, may be frequently heard to ſay, that it is impoſſible to carry on trade without lying. Why does he not add, in plainer terms, without forfeitng all hope of Salvation?

But every vice, (for here we are guilty of them all) every vice, I ſay, would furniſh a copious ſubject of complaint, and conſequently of the moſt dreadful apprehenſions. Where ever we turn our eyes we meet with acts of oppreſſion, ſcenes of idleneſs, drunkenneſs and debauchery; whilſt our ears are ſtunn'd with oaths and curſes. Is this a Chriſtian, this a reformed country? Would to God that we were as much reformed in our manners as in our religion; for without this, our reformation is but a name. The bulk of the people own God with their mouths, while their actions give the lye to their faith. For theſe to pretend to religion is to affront the righteous Lord of heaven and earth, who hates hypocriſy and will not be mock'd: God diſdains the ſacrifice of impenitent ſinners; their prayers are an abomination. Repent, repent, there is no other way to obtain mercy. If we may judge from the number and aggravation of our crimes we have reaſon to fear that the next earthquake will be as dreadful as any of thoſe recorded in hiſtory. But let us with repentant

repentant hearts and humble tears implore the mercy of God, *for a broken and a contrite heart he will not deſpiſe. Let us forſake our ſins and turn to the Lord, and he will have mercy.* Methinks I ſee the guilty wretch throw his eyes over a diſmal ſcene of deſolation, trembling with wild amazement at the gaping earth, and calling on that God for pity whom he has frequently called upon for damnation; O what diſtreſsful looks! what ſhrieks! what groans! thou haſt eſcaped from thy falling houſe, but canſt not fly from God. See that crowd hurrying along, what a dreadful chaſm opens before them; theſe behind know nothing of it; behold they preſs forward, and ſtruggling to get foremoſt, drive numbers down the frightful gulph. Horrors are on every ſide --- But let us turn away our Eyes from this ſhocking view. If you ſhould never behold a ſcene like this (and I hope and wiſh you never may,) yet what have you here to fear that you will not certainly meet with? you muſt die, and h re you can do no more, and you may meet a death for which you may be equally unprepared; a death, that to every individual will have all its future conſequences, what ever be the means that brings you to it. Let me then intreat you, let me with tears intreat you to be prepared for that awful moment; to prepare for it by a thorough change of heart and life, and ardently to beg that God will bleſs and confirm the change: a change that will ſecure your happineſs here, and hereafter give that felicity that is unfading and eternal. We are born to be happy, and therefore we are born to

be religious. But what is this Religion? *what doth the Lord thy God require of thee? It is to do Juſtice, to love Mercy, and to walk humbly with thy God*; or, in other words, it is a devout gratitude to that Being, to whom all gratitude and affection is due; it is love, it is friendſhip, it is humanity to mankind. Can there be a greater a nobler pleaſure than that which ariſes from the reflections of a grateful mind? can there be on earth more pleaſing ſatisfactions than thoſe which reſult from aſſiſting the miſerable, and from friendſhip, harmony, and love, and the mutual exchange of good actions between man and man.

The pious, the good man has no reaſon to be diſturb'd at the fate of the world; for while his conſolation is within, and his hopes fix'd on high, he may juſtly ſmile amidſt the moſt dreadful convulſions of nature, ſupported by the teſtimony of a good conſcience. He will view earthquakes and death with a mind unruffled; and *tho' the earth be ſhaken, and the mountains removed out of their place, yet will he rejoice in the God of his Salvation.*

BRITISH
9 JY 74
MUSEUM

F I N I S.